



***Response to Texas House of Representatives Transportation Committee
Request for Information Interim Charge 3
Submitted September 18, 2020***

Interim Charge 3

Study the technology and safety aspects of autonomous and semi-autonomous vehicles, including predictive capabilities and the potential for dedicated freeway and surface lanes for public transportation, autonomous vehicles, and semi-autonomous vehicles. Make recommendations for optimizing state policy to prepare for varying vehicle technologies to ensure safety and traffic reliability on Texas roadways.

Executive Summary

- Our companies are developing highly automated Class 8 commercial vehicles that will operate without a driver on limited access highways, driving from one freight transfer hub to another.
- Over the past two years, Texas has become a focal point for the development and testing of highly automated freight trucking technology. This comes as a direct result of the Legislature's decision to pass S.B. 2205 in 2017, and was accelerated by the tremendous support from the Texas Department of Transportation (TxDOT) and its Connected and Autonomous Vehicle Task Force.
- Texas's leadership role in self-driving freight technology will pay long-term dividends by way of new jobs, enhanced safety, reduced congestion, and improved freight efficiency. To further accelerate this trend, the Legislature should consider:
 - Supporting existing efforts to develop standardized commercial vehicle inspection processes for self-driving trucks
 - Working with TxDOT to make Texas highways more friendly to self-driving trucks
 - Investing in truck parking that can be used as "transfer hubs"
 - Encouraging coordination across states to support the interstate nature of highly automated freight trucking
- Fundamentally, the investment in Texas by a wide range of highly automated vehicle developers indicates the current policy and regulatory environment is working. Given the long development times for AVs, regulatory certainty is a key component when evaluating where to establish testing and operations hubs. We encourage the Legislature to ensure continuity with existing rules and continue to engage with AV developers in the state on any potential changes.

Introduction

As developers of highly automated long-haul trucking technology, we would like to begin by thanking Chairman Canales, Vice Chair Landgraf, and the members of the Texas House of Representatives Transportation Committee for this opportunity to update the Legislature and Texans on Texas's automated vehicle (AV) industry.

Texas has long been a leader in transportation technology, but the Legislature's 2017 passage of S.B. 2205 helped to create a now flourishing automated vehicle technology ecosystem in Texas. Today, Texas is one of the major epicenters of self-driving truck testing. At least four technology developers, Aurora Innovation, Kodiak Robotics, TuSimple and Waymo, have chosen to build testing and operations hubs in the Dallas-Fort Worth metroplex, while Embark has tested in-state previously and plans to extend their operational routes to Texas. We believe that the growth of this industry in Texas will create jobs, increase road safety, and improve quality of life for Texans.

Our goal in this response to the House Transportation Committee's Interim Charge 3 Request for Information (RFI) is to provide an overview of the current state of highly automated long haul trucking as an industry, summarize our operations and interactions in Texas, and recommend how the Legislature could further bolster safety and innovation in the space.

Automating the Freight Trucking Industry

While self-driving passenger cars have captured more public imagination over the past decade, most industry experts now believe that highly automated trucks, operating primarily on highway routes, will likely be the first commercially-viable application of self-driving vehicle technology. Unlike passenger vehicles, self-driving trucks can be operated profitably mostly or exclusively on divided, limited-access highways, thus avoiding many of the pedestrians, pets, and bikes that make urban and suburban driving complex and unpredictable. In this model, self-driving trucks will depend heavily on handing off freight to human-driven trucks for city and suburban driving, preserving a key role for traditional drivers and creating more local trucking jobs. This constrained operating model also means that self-driving trucks are close to becoming a reality: our companies all plan on deploying self-driving trucks at significant scale by the end of the decade.

We believe truck automation will have wide-ranging benefits for the Texas freight industry, any industry that relies on moving goods via truck, and the broader community of road users. This long list of advantages stems from a core principle of highly automated trucking: allowing an Automated Driving System to manage the monotonous task of long haul, on-highway trucking, enables shippers to transport goods faster at lower risk and cost. Primary advantages of self-driving trucks generally relate to either roadway or economic benefits.

Roadway Benefits

- **Safety:** By removing risks of distraction, drowsiness, and intoxication, highly automated trucks avoid huge safety risks identified as the primary causes of many vehicle crashes. Over 4,000 Americans died in crashes involving commercial trucks in 2018. Estimates suggest over 90 percent of those crashes were due to human error. Self-driving trucks will also provide a degree of predictability reassuring to other road users. They will largely stay in the right lane, they will never weave in and out of traffic, and they will never speed.
- **Reduced traffic congestion:** Because self-driving trucks are not limited by hours-of-service and daylight driving preferences, fleets can be dispatched to avoid traffic and reduce congestion. This will make our highway system safer and more efficient. Even when they are in traffic, self-driving trucks will help improve traffic flow: a study by [researchers at Bar-Ilan University](#) in Israel suggests that transitioning just 5% of vehicles to AVs will increase traffic flow speeds by 40 percent, and reduce fuel consumption by 28 percent.

Economic Benefits

- **Strengthen competitiveness:** To stay globally competitive, American industries need safe, efficient, and cheap ways to move goods. With the ability to operate beyond human limits of hours of service, self-driving trucks could move freight across the country in two days instead of five, with a lower cost of operation. Access to highly automated trucking will improve Texas industrial competitiveness, expand markets for Texas producers, and grow the Texas economy.
- **Revitalize the trucking workforce:** Over-the-road truckers work incredibly hard and often spend days or weeks away from their families. Bureau of Labor Statistics data shows trucking is the [most dangerous common job in the US](#). While some drivers love the job, many others are no longer willing to accept the tradeoffs, which is why the industry faces an estimated shortage of about 60,000 drivers. By automating highway miles and relying upon human drivers for city driving, self-driving trucks will create more trucking jobs that allow drivers to stay close to home.
- **Resilience:** Self-driving trucks do not get injured or sick, and will make our critical transportation infrastructure more resilient to disruptions in the availability of drivers.
- **Reduced fuel consumption:** Estimates indicate that self-driving trucks are ten percent [more fuel efficient](#) than their human-driven counterparts. That means self-driving trucks have the capacity to save millions of gallons of diesel fuel every year for an industry where fuel is a significant cost burden.

Texas in particular stands to benefit from this technology given its stature as one of our nation's predominant freight hubs. The efficient and cost-effective movement of goods plays a critical role in the Texas economy, with more than 2.2 billion tons of freight moving within the state in 2016. Texas industries from energy and agriculture to manufacturing and construction rely on

freight trucking. The decisions Texas makes today will help prepare the state to support freight volumes expected to increase from 2.2 billion tons in 2016 to 4 billion tons by 2045, driven by rapid population growth and changing consumer and business practices.

Current State of Freight Trucking Automation in Texas

As described briefly above, numerous companies in the highly automated truck technology industry have chosen to operate in Texas. This includes the three companies submitting this RFI response.

- Kodiak Robotics has built its testing and operations hub in Lancaster, Texas, and has made daily deliveries for commercial customers between the Dallas-Fort Worth metroplex and Houston since mid-2019.
- TuSimple tests and operates its test fleet from El Paso to Dallas-Fort Worth on a daily basis for customers like UPS. Over the next few years, TuSimple will expand operations into the Houston and San Antonio markets.
- Embark has tested on the I-10 in Texas in the past, and is planning to expand its current California-Arizona test route into Texas in the coming years.

Beyond our three companies, numerous companies in the AV space have also chosen Texas as their home.

- Several other self-driving vehicle companies applying their technology to freight trucking, including Aurora and Waymo, recently announced plans to build operations hubs in the Dallas-Fort Worth area.
- Numerous companies developing last-mile delivery device technology, including Nuro and FedEx, are testing their technologies in Texas.
- AV passenger vehicle developers, including Uber and Argo, have also announced plans to test in Texas.
- Peterbilt manufactures on highway, vocational and medium duty trucks at its headquarters in Denton, TX. Peterbilt, with its parent company PACCAR, is developing automated truck technology, as well as partnering with highly automated truck developers like Embark, Kodiak, and TuSimple.
- Truck manufacturer Navistar recently broke ground on a \$250 million manufacturing facility for Class 6-8 trucks in San Antonio. Earlier this year, Navistar announced a strategic partnership with TuSimple to jointly develop and manufacture automated trucks.

Our companies communicate frequently with TxDOT and local officials to keep them apprised of our operations and to find opportunities for collaboration. We are also active participants in TxDOT's Connected & Automated Vehicle (CAV) Task Force, with representatives on four of the five subcommittees and Kodiak serving as Co-Chair of the Freight and Delivery subcommittee. TuSimple and Kodiak both also participate in and sponsor the Texas Mobility Summit conducted by Texas Innovation Alliance in partnership with TxDOT. We also frequently interact with

Texas's Department of Public Safety and the University of Texas whenever opportunities for law enforcement, safety, or education collaboration arise.

Safety Policy

Improving safety is the biggest challenge of AV technology, and also its greatest potential benefit. Our companies have publicly committed that we will not deploy our technologies without human Safety Drivers until we can demonstrate that they are safer than human drivers. This *safety case*, or comprehensive argument that an AV is safer than a human, is at the heart of all of our technology programs.

While industry has made considerable progress in determining how to build a safety case, there remains no single process, standard, or best practice for safety case development. Indeed, most companies in the industry view the work they are doing to develop their safety case to be highly proprietary. Most approaches combine elements of a variety of different standards, including ISO 26262, ISO/PAS 21448, and UL-4600, as well as internal company research and processes, to guide safety case construction. Given the incredible research and progress occurring regarding safety cases, we strongly recommend that the Legislature continue to let the market develop a consensus approach before taking a position on safety standards and metrics.

Proactive Policy Recommendations

We strongly support Texas's current policy environment surrounding the deployment of automated vehicle technologies, including highly automated trucks, and believe that no specific legislative or regulatory changes are necessary for the deployment of AVs. Texas's current legislative and regulatory approach is well suited for the current level of ADS technology development by requiring compliance with existing safety rules without being overly prescriptive. Texas should maintain its stature of thoughtful AV leadership by preserving the regulatory certainty provided by this current framework. As ADS technology develops, opportunities to evolve this framework will surface through the numerous stakeholder engagement venues the Legislature and TxDOT continue to prioritize.

Nevertheless, there remain some policy initiatives that could further support and facilitate the deployment of highly automated trucks. It's important to note that each of these policies would be broadly beneficial to all motorists, not just automated trucks. We have split these proposals up into infrastructure and non-infrastructure policies.

Infrastructure Policy

Texas's world-class highway infrastructure is one of the factors that attracts the developer community to Texas. Additionally, all of the companies presenting this RFI believe that no new infrastructure is *necessary* to allow for the commercialization of self-driving trucks: our

technology is designed to operate on today's highways with no additional infrastructure investments. That said, there remain infrastructure policies and investments that could help drive rapid adoption of this critical technology. It's important to note that most of these proposals would also make the roads safer and better for human drivers as well. These proposals include:

- **Maintaining Texas's highways:** In many cases, it is the simplest infrastructure investments that can be most useful to the AV industry. Since self-driving trucks rely in part on lane lines for localization, maintaining high-quality lane striping is extremely important for AVs. Potholes, roadway cracks, and other road maintenance issues can also pose challenges for both ADS and human drivers.
- **Further standardizing construction zones:** Navigating roadway construction zones remains one of the biggest challenges for AVs, but some simple policy changes could make them easier for AVs and safer for all drivers. These include:
 - Further standardizing work zone geometries, including lane widths, so AVs and drivers better know what to expect
 - Repainting lane lines in construction zones, even for short-term projects
 - Limiting forced merges or sharp curves
 - Utilizing more signage and more consistent signage
 - Ensuring that construction zone data is updated in real-time on the Work Zone Data Exchange (WZDx), which Texas is developing with the Federal Highway Administration
 - Maintaining shoulders in work zones to the extent possible
- **Truck parking/transfer hubs:** As described above, most companies in the highly automated long-haul trucking industry plan to utilize an operations model that substantially limits operations to limited-access highways. This means that highly automated truck operators will need access to highway-adjacent parking facilities where loads can be switched between human drivers and self-driving trucks. Additional investment in highway-adjacent truck parking would help speed adoption of this technology, and would also alleviate the truck parking shortage.
- **Dedicated lanes:** This RFI requested feedback regarding the possibility of dedicated lanes for automated vehicles. As described above, all of our companies (and most of the industry) are developing technologies designed to work with today's highway infrastructure. While we do not oppose dedicated lanes, we do not believe them necessary for commercialization. Additionally, we would oppose any infrastructure policies that would constrain automated truck access to roadways otherwise accessible to human driven trucks.
- **V2X infrastructure:** We believe that the mass adoption of V2X technology would be beneficial to the development of AV technology, and could provide safety and efficiency benefits to a wide range of road users, including AVs. However, V2X is not necessary for the safe deployment and commercialization of self-driving trucks. Even once V2X technologies become widespread, our trucks must be able to operate safely without them—a network outage cannot lead to a potential safety risk. TxDOT's leadership on freight-specific V2X technology through the Texas Connected Freight Corridor project is

a particularly exciting opportunity for the industry, and has the potential to significantly benefit both our companies and traditional human trucker drivers.

Non-Infrastructure Policy

In addition to infrastructure needs, there are a handful of policy changes that could help drive the growth of Texas's self-driving truck industry. These include:

- **Leading on commercial vehicle inspections:** One of the critical policy issues to be addressed regarding the deployment of highly automated trucks is determining how such vehicles shall be inspected by law enforcement. The Federal Motor Carrier Safety Administration is currently leading a project to develop a consensus approach to inspecting highly automated trucks. This project is being supported by the Commercial Vehicle Safety Alliance, which represents commercial vehicle enforcement officials in the 50 states as well as Canadian provinces, and the American Trucking Association's Technology and Maintenance Council. Making Texas the first state to implement these consensus approaches as they develop will help cement Texas's leadership in this space.
- **Leading outreach to other states:** Automated freight trucking will take place on an interstate basis, making coordination between states and with the federal government on commercial AV policy important for the future growth of the industry. We encourage the Legislature to support efforts by TxDOT to work with other states and the Federal Motor Carrier Safety Administration in order to facilitate operation of automated commercial vehicles across state lines. For example, the I-10 Corridor Coalition could play an important role in ensuring automated trucks do not face highly variable policy, regulatory, and inspection environments when transiting the I-10 from California to Texas.